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## (54) Motor-cycle radial tyre

(57) A radial motor-cycle tyre (1) reinforced by a breaker assembly (5, 7) and a bandage (6) and having in its normally inflated condition a camber value C/L of between 0.5 and 0.7 has a carcass ply (14) of radially disposed cords radially inward of the breaker assembly and is characterised in that the breaker assembly comprises two breaker plies (5, 7) comprising aromatic polyamide cords oppositely inclined at between 16 and 30 degrees to the circumferential direction of the tyre and the bandage (6) comprises nylon cord reinforced material, eg up to 8 nylon cords side by side, and is formed radially outside and adjacent to the breaker assembly and is inclined at less than 5 degrees to the circumferential direction.

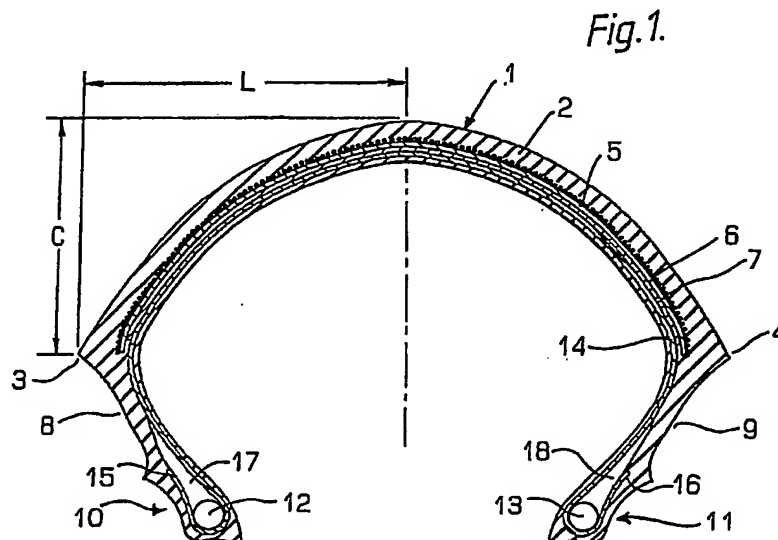
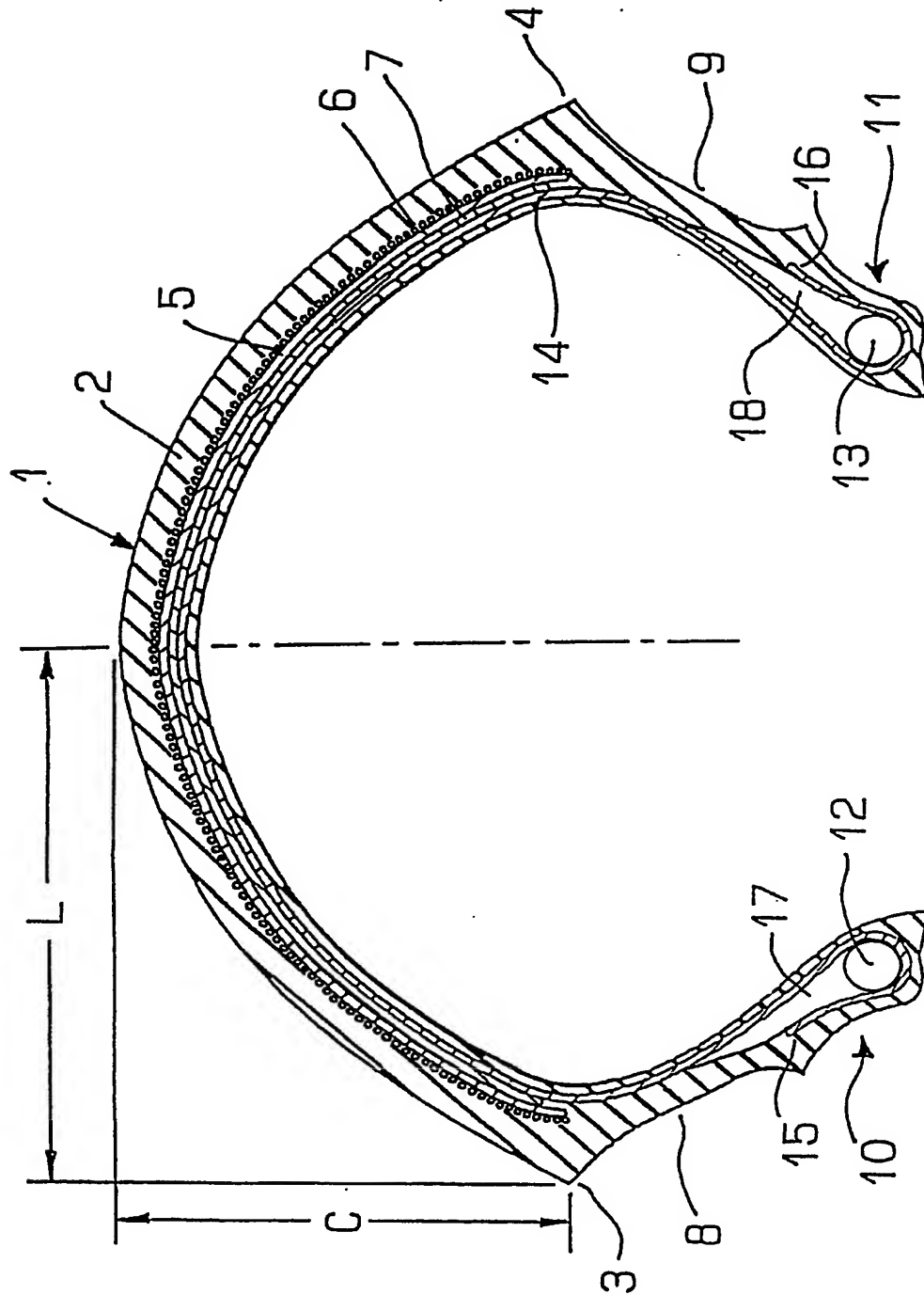


Fig. 1.



MOTOR-CYCLE RADIAL TYRE

This invention relates to radial motor-cycle tyres and in particular but not exclusively to high performance or race motor-cycle tyres.

Such tyres utilise very wide treads which in transverse cross-section are sharply curved to provide good contact with the road surface when the motor-cycle is steeply banked in cornering. Maintenance of a consistent ground contact area or 'tyre footprint' under all conditions is a major problem in determining general vehicle handling. Of particular importance in race motorcycle tyres of radial construction is the provision of high cornering power with the good stability to maximise cornering speeds under race conditions.

Present radial motor-cycle race tyres have short sidewalls which extend to the tread edges radially and axially outwardly from the tyre beads. The beads provide engagement to the wheelrim on tapered bead seats. The sidewalls are reinforced by radial carcass plies which when tensioned by the inflation

pressure act together with sidewall geometry to provide location of the curved tread regions to withstand cornering forces.

The sharply curved tread region of the tyre is specially reinforced by a reinforcing breaker to give the required structural rigidity to allow for banking over of the motorcycle when cornering whilst giving sufficient flexibility to allow localised tread flattening in the ground contact patch for good road grip.

An object of the present invention is to improve the properties of such tyres.

According to one aspect of the present invention a radial motor-cycle tyre comprises a tread reinforced between its edges by a breaker assembly and a bandage and having in its normally inflated fitted condition a camber value C/L of between 0.5 and 0.7, a reinforcing carcass ply of radially disposed cords extending radially inside the breaker assembly and between two bead regions and wrapped in each bead region around an annular bead

core from the axial inside to the outside to form carcass ply turn-ups and between the tread edges and bead regions, tyre sidewalls characterised in that the breaker assembly comprises two breaker plies comprising aromatic polyamide cords oppositely inclined with respect to the circumferential direction of the tyre and the bandage comprises nylon cord reinforced material and is formed radially outside and adjacent to the breaker assembly.

By camber value is meant the ratio  $C/L$  between the radial distance  $C$  from the centre to the edge of the tyre tread and the axial distance  $L$  between the centre and edge of the tread.

Preferably the cords of the breaker plies are inclined at between 16 and 30 degrees and the cord reinforcement of the bandage is inclined at less than  $5^{\circ}$  to the circumferential direction of the tyre.

The bandage may comprise a single nylon cord spirally wound around the tyre across the breaker

assembly or it may comprise a plurality of between 2 and 8 cords formed side by side in a tape and wound spirally around the tyre. the nylon cord or cords are preferably embedded in a rubber compound. Also preferably the nylon cord is a low extensibility cord having an elongation of less than 8% at 21°C under a load of one third of the cord breaking load.

Further aspects of the present invention will become apparent from the description of the following embodiments in conjunction with the attached diagrammatic drawing in which:-

Figure 1 shows in cross-section a 185/55 R17 radial motor-cycle tyre intended for high speed racing.

The tyre 1 of Figure 1 comprises a pair of sidewalls 8 and 9 terminating in bead regions 10 and 11. Each bead region is reinforced by an inextensible annular bead core 12 and 13. Extending between each bead region is a tyre carcass reinforcement ply 14 which is anchored in

each bead region by being turned around the respective bead core 12,13 laterally from the inside to the outside to form a ply turn-up 15,16. The carcass reinforcement ply 14 comprises a single ply of nylon tyre fabric laid with the cords substantially radially. Each bead region 10,11 further comprises a hard rubber apex member 17,18 which is anchored to each respective bead core 12,13 and extends taperingly radially outwardly.

The tyre 1 has a camber value of 0.6 and comprises a convex tread region 2, having tread edges 3,4, reinforced by a breaker assembly. The breaker assembly comprises two breaker plies 6 and 7 each of which comprises Kevlar (Registered Trade Mark) aramid cord tyre fabric each of 2/165 TEX. The cords in each of the breaker plies 6 and 7 are oppositely inclined to each other at an angle of  $25^{\circ}$  to the circumferential direction of the tyre. The radially inner breaker ply 7 is narrower than the radially outer breaker ply 5.

Radially outside and immediately adjacent to the breaker assembly is a bandage comprising a rubber

covered single nylon cord of 2/94 TEX. This cord had been subjected to heat stretching by 2% such that the elongation of the cord under a load of one-third of the cord breaking load was 9.2%. The bandage was formed by winding the cord in a spiral manner around the tyre circumference and across the full width of the breaker assembly overlapping the ends of the outermost wider ply 7 by a small amount. Formed in this manner the cord of the bandage lies at substantially  $0^{\circ}$  to the circumferential direction of the tyre.

In a second embodiment of the present invention the tyre construction was as above except that the bandage was formed from a nylon cord of 2/140TEX. This cord had been heat stretched by 8% and consequently had a lower elongation of only 6.3% when tested at  $21^{\circ}\text{C}$  under a load of one-third of the cornering power.

The resultant tyres have been found to have improved cornering power and stability under all conditions and improved grip. This construction has also been shown to give superior fatigue life.



Whilst the above-described embodiments have a bandage formed by a single rubber coated nylon cord spirally wound around the tyre the bandage may be formed from a spirally wound tape comprising between 2 and 8 cords laid side by side and embedded in rubber.

CLAIMS

1. A radial motor-cycle tyre (1) comprising a tread (2) reinforced between its edges (3,4) by a breaker assembly and a bandage (6) and having in its normally inflated fitted condition a camber value C/L of between 0.5 and 0.7, a reinforcing carcass ply (14) of radially disposed cords extending radially inside the breaker assembly and between two bead regions (10,11) and wrapped in each bead region around an annular bead core (12,13) from the axial inside to the outside to form carcass ply turn-ups (15,16) and between the tread edges (3,4) and bead regions (10,11), tyre sidewalls (8,9) characterised in that the breaker assembly comprises two breaker plies (5,7) comprising aromatic polyamide cords oppositely inclined with respect to the circumferential direction of the tyre and the bandage (6) comprises nylon cord reinforced material and is formed radially outside and adjacent to the breaker assembly.

2. A motor-cycle radial tyre according to claim 1 wherein the cords of the breaker plies (5,7) are

inclined at 16 to 30 degrees with respect to the circumferential direction of the tyre.

3. A motor-cycle radial tyre according to either of claims 1 or 2 wherein the nylon cord reinforcement of the bandage is at less than  $5^{\circ}$  to the circumferential direction of the tyre.

4. A motor-cycle radial tyre according to any of claims 1 to 3 wherein the bandage (6) comprises a single cord spirally wrapped around the circumference of the tyre.

5. A motor-cycle radial tyre according to any of claims 1 to 3 wherein the bandage comprises a plurality of between 2 and 8 nylon cords laid side by side in the form of a tape which is spirally wound around the tyre.

6. A motor-cycle radial tyre according to any of claims 1 to 5 wherein the bandage comprises low extensibility nylon cord having an elongation of less than 8% under a load of one-third of the cord breaking load.

7. A motor-cycle radial tyre according to any of claims 1 to 6 wherein the bandage (6) extends across the full width of the widest breaker ply (5,7).

8. A motor-cycle radial tyre according to any of claims 1 to 7 wherein the radially outermost breaker ply (5) is wider than the radially innermost breaker ply (7).

9. A motor-cycle radial tyre according to any of claims 1 to 8 wherein the bandage comprises nylon cord reinforcement embedded in rubber.

**Patents Act 1977**  
**Examiner's report to the Comptroller under Section 17**  
**(The Search report)**

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**Relevant Technical Fields**

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(ii) Int Cl (Ed.5) B60C 9/00, 9/18 - 30

Search Examiner  
C J DUFF

Date of completion of Search  
30 NOVEMBER 93

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-  
1-9

**Categories of documents**

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|---|---|
| <b>X:</b> Document indicating lack of novelty or of inventive step.   | <b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.        |
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| <b>A:</b> Document indicating technological background and/or state of the art.   | <b>&amp;:</b> Member of the same patent family; corresponding document.   |

Category	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 2157239 A (METZELER ...) whole document	3
X, Y	EP 0157617 A2 (SUMITOMO ...) whole document	X: 1, 2, 7, 8 Y: 3

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

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